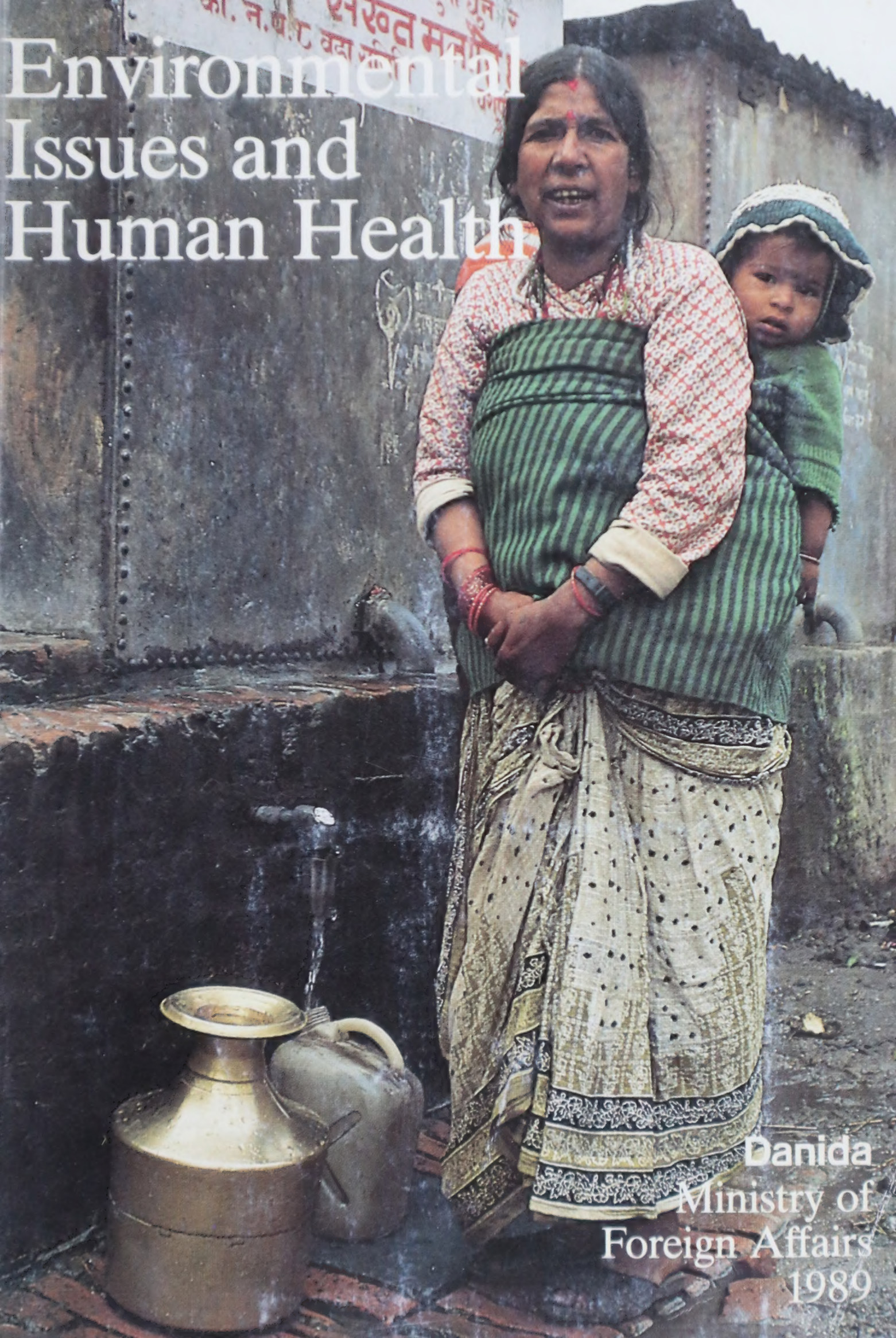
Environmental Issues and Human Health



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Plan of Action For Integration of
Environmental Considerations
into Danish Development Assistance

A Strategy for Human Health

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Introduction

On May 21st 1987 the Danish Parliament considered the role of development cooperation in contributing to environmentally sound and sustainable management of natural resources in developing countries. The Parliament concluded its deliberations by passing a resolution put forward by the Government which stipulated that a plan of action be prepared for strengthening the effort on natural resources rehabilitation and conservation in official Danish development cooperation.

The plan of action shall provide a coherent strategy for complete and systematic integration of environmental considerations into Danish development cooperation. The debate in Parliament was inspired inter alia by the report of the World Commission on Environment and Development and the strategy of the plan is to pursue environmentally sound and sustainable development as defined by the Commission, that is to provide for the needs of the present generation without compromising the ability of future generations to meet their own needs. In line with the thinking of the Commission, the intention is neither to consider environmental issues in isolation nor to concentrate on conservation of nature in a narrow sense. The environment must be regarded as a cross-cutting element rather than a sectoral one.

The Plan of Action comprises three parts:

Part I:
An Overall Strategy which contains general guidelines for sharpening the focus on environmental issues in Denmark's multilateral and bilateral programmes. Part I was presented in Parliament in January 1988.

Part II:
Sectoral strategies for integration of environmental considerations into planning and implementation of programmes and projects within the main sectors of concentration of Danida's programme.

The six sectoral strategies which will be issues in autumn 1988 cover the following areas:

1. Environmental Issues in Water Management
2. Environmental Issues in Dryland Agriculture
3. Environmental Issues in Fisheries Development
4. Environmental Issues in Agriculture in Humid Areas
5. Environmental Issues in Urban and Industrial Development
6. Environmental Issues in Human Health

Part III:
Country strategies for increasing the effort on natural resources rehabilitation in the main countries of cooperation, i.e. Tanzania, Kenya, Sudan, India and Bangladesh. Consideration will also be given to upgrading the status of environmental aspects in the planning and implementation of assistance to other countries substantially involved in Danish development cooperation.

The present paper is one out of the six sectorial strategies which will be worked out under Part II of the plan of action. It deals with environmental issues associated with human health.

In the last 10–15 years most developing countries have witnessed a decline in the life-quality of the poorer sections of their populations. This has been accompanied by and related to degradation of the physical environment which forms the very basis of existence of their people. While negative economic, political, demographic and social development trends are the fundamental causes of the deterioration of human health and environmental quality, some forms of development interventions have contributed to worsen the situation. The improvement of the economic and social conditions required to establish control over population growth may not materialize in the near future and a population policy must therefore also include other factors, such as improved health services, better education and advancement of the status of women. The explosive growth of urban settlements, far beyond the capacity of housing, sanitation and water supply facilities creates special problems, particularly for the inhabitants of slum settlements. The lack of institutional and managerial capacity and capability in the health sector combined with reliance on centralized and compartmentalized approaches to public health care have hampered the extension of a needs-oriented and truly effective health service system and the spread of knowledge about relevant health issues to the wider population. Recently, policies of economic austerity have implied significant cut-backs in public expenditure on health services.

This strategy consists of three different sections. Section I provides a review of the major environmental issues related to health. In Section II the experience accumulated from efforts to deal with these issues is discussed. At the request of Danida these two sections have been prepared by the Danish Bilharziasis Laboratory. While Danida has discussed the overall findings of these two sections with the authors, they are responsible for the details of the contents and opinions expressed and conclusions made therein do not necessarily reflect Danida's policy.

Section III contains the guidelines for addressing environmental issues in Danida's programme in the future. The guidelines, which have been prepared by an internal working group in Danida and submitted for review at an external hearing with interested agencies, research institutions and organisations in Denmark, now form part of Danida's policy on programme and project identification and planning.

Section I: Environmental Issues Related to Human Health

1. Introduction

The well-being and good health of human beings are inextricably linked to the sound management of the environment, as highlighted in the recent report "Our Common Future" by the World Commission on Environment and Development. In many countries the ecological changes induced as a result of man's activities have led to a severe deterioration in human health. In addition, major ecological disasters and armed conflicts are significant constraints to health improvements.

The definition of health according to the World Health Organisation is not only freedom from disease and infirmity but a condition of complete physical, mental and social well-being. This concept of health is an ideal rather than a viable objective, which involves many different interrelated environmental factors at the global, national, community, family, and individual levels. It also implies that any intervention must be seen in the light of national history, traditions and cultures, and of the existing social, economic and political structures.

A central component in development is to prevent the onset of major health problems arising from environmental changes. It is therefore of vital importance that development is based on recognition of the interrelationship between human health and the management of natural resources and the environment, and that sustainable strategies are identified for managing the environment. An appropriate way of identifying and solving any problems stemming from this interrelationship is vital.

It is beyond the scope of this report to deal with the complex interaction between the environment and human

health. Instead, this is an attempt to identify some of the more significant components of the relationship, and some of the main lessons learnt from previous programmes aimed at addressing related problems in developing countries.

2. Demographic Trends

2.1. The Increase in Human Population

Global population growth has been unprecedented in recent decades with Africa and Asia alone accounting for 85% of the increase since 1950. By 1985 the world's population reached 4.8 billion. During the same period there has been a continuous increase in life expectancy and a marked decline in infant mortality. Health indicators from 1950 – 1985 show that life expectancy increased from an average of 37.5 to 49.7 years in Africa and from an average of 41.2 to 57.9 years in Asia. Infant mortality rates per 1000 live births declined in Africa from 157 to 114 and in Asia from 133 to 87. Current predictions forecast a world population of 6.1 billion by the year 2000 and 8.2 billion by the year 2025.

Increased life expectancy and decreased infant mortality are clearly affecting population growth. However, sustained and even increased birth rates due to poverty and deteriorating living conditions in many developing countries are major factors as well, accounting for increasing population growth rates. Insecurity concerning the survival of the household can be a strong motive for families to have many children, as a source of labour, a source of income, and a support in old age. A breakdown of cultural values and customs as a result of recent development may also contribute to increased birth rates in some areas. These are the main causes of the present population growth. Despite this trend, some developing countries have actually experienced a significant drop in birth rates during the 1980s, especially evident in South East Asia and China, where such a decline may be attributed to family planning and to a change in marriage patterns. There is also a financial incentive in China, backed by legislation, to limit the family to one child.

Large populations that show no sign of decline are to be found in the sub-saharan part of Africa and in Pakistan and Bangladesh. Kenya has one of the highest growth rates in the world (4%) and the present population is expected to double by the year 2000. The resulting pressure on land has led to a massive migration to the cities, leaving many rural households headed by women. These families continue to maintain high birth rates and the women are seriously exposed to deteriorating health conditions be-

cause of increased work load, frequent pregnancies, and food shortages. They also tend to bear children with lower birth weights who in turn are more susceptible to health hazards.

The health conditions of any population are closely linked to the environment and management of natural resources. The exceedingly high rate of population growth in low-income countries is bound to deplete scarce natural resources in these areas, and thereby affect the health of their population. This situation also leads to increased migration to the cities. Health problems here can be related to cultural uprooting, food deficiencies, deteriorating water and sanitary conditions, limited educational facilities, as well as overburdened health services. The rapid growth of cities and industrial pollution, undermine the general health of the population. Even expanding the health service will have limited beneficial impact, where the pressing health problems are related to food, water, fuel, and general living conditions.

Population stabilization cannot take place unless it is tied up with overall socio-economic development. In the long term only economic growth or a more equal distribution of wealth can achieve this. Despite the high population growth in developing countries it should not be forgotten that population density is not yet as high, and the use of the world's natural resources not yet as exhaustive, as in the developed countries.

2.2. Urbanization

Aspects of health problems related to the urbanization process are also dealt with in chapter 3.1., 3.2., 5.1. and 5.3. This section deals with topics not considered in these chapters.

The annual urban population growth in East Africa and South Asia has been approximately 6–7% in the period 1960–1980, which is 2–4% above the annual population increase. The major part of this demographic shift is caused by migration. In areas like Nairobi and Thika in Kenya, a large proportion of migrants are men in search of work. This trend has great social significance, not only in the towns where men are obviously in the majority, but also in the rural areas where the women and children remain.

The growing cities cannot accommodate the increasing population, and unplanned human settlements spring up. These slum settlements are without water, sanitary and

other basic facilities, and life is made more difficult by unemployment and human crowding. The result is a concentration of serious health problems, and the creation of ideal conditions for infectious, vector-borne, respiratory and parasitic diseases.

Overcrowding enhances the transmission of communicable diseases and the increasing problems of air pollution lead to respiratory illnesses and cancer. Two serious health problems, sexually transmitted diseases and traffic accidents, have become especially intensified as a result of urbanization. In both cases, the groups most affected are young, socially and economically active adults. A breakdown of social and cultural values, unemployment and prostitution provide the background in which sexually transmitted diseases flourish, taking on a new dimension with the onset of AIDS. Traffic accidents are alarmingly high in number and kill or mutilate proportionately far too many. The high frequency often results from the poor standard of roads and cars, reflecting economic conditions and lack of basic traffic regulations. Apart from the human tragedy and the social catastrophe which these events cause, great pressure is also put upon hospitals and other resources in the health sector.

3. Industry and the Working Environment

3.1. Industrialization

Industrial development has affected human health, both beneficially through the creation of new livelihood opportunities and adversely through the creation of public and occupational health hazards. In addition, industry may undermine the conditions of human health by unsustainable use of the natural resources and the environment on which people depend for their survival and well-being.

At the time of decolonization, most developing countries had little or no modern industry. In order to attract foreign industrial investments they offered less stringent controls than industrialized countries and gave priority to industrial build-up rather than environmental conservation and the safety of the labour force. The first industries established were generally the least profitable and the most polluting. The developing countries have now become the dumping grounds and dust bins of the particularly polluting industries, such as chemical and metal industries, textile mills, tanneries and leather industries. Industrial waste emerges in various forms, usually classified according to its final recipient: air, water or soil. In most cases the emission of pollutants results in long-term exposure, where the impact on human health is difficult to assess.

Just as in the developed countries, major air polluting industries include iron, steel and other metal industries, chemical industries, cement and brick works and thermal power stations, releasing chemicals and dust into the air. The burning of fossil fuels, combined with exhaust from car engines, causes irritation, poisoning, and respiratory diseases. Acid rain destroys vegetation, and industries located in tropical areas with static meteorological conditions cause serious air pollution. Release of carbon dioxide (from burning of fossil fuel) and freon gas (from leaking refrigerators or air conditioners) may in the long run affect the climate on a global scale.

Water is a vital element in a number of industrial productions, either as part of the product (beverages and food) or for cleansing or cooling. Factories that pump out their waste-water into rivers may directly endanger the

health of downstream populations who use it for bathing, drinking water and fishing.

Industrial waste-water pollution may have a detrimental effect on fishing, directly or indirectly, as well as creating long-term risks to human health caused by the accumulated pollutants in fish and shellfish. In India, more than 70 percent of water resources are now considered to be polluted, and river conditions are among the worst in the world.

The knowledge of solid industrial waste is poor in the developing countries. Industries producing solid waste include textile, leather, iron and chemical industries. Uncontrolled dumping of hazardous waste might cause percolation of harmful substances into ground water, not least in monsoon areas. The problem is not limited to waste produced on-site. Recently attention has focused on the dumping of hazardous waste from industrialized countries in Africa.

Industry is frequently concentrated in or around large cities, with increased health hazards for the large and dense urban populations. Lack of adequate supervision can lead to explosions, fires and accidents where dangerous materials are involved while insufficient infrastructure makes it impossible to evacuate people in time. The recent Bhopal incident is a frightening example of this.

3.2. The Occupational Environment

Most production processes have occupational health implications. The occupational environment may expose workers to health risks such as accidents, noise and vibration, ergonomic strains, toxic chemicals, and infectious organisms.

Farming is still the dominant occupation in most developing countries. Traditional agriculture is not free from occupational hazards, but they are commonly recognized by the farming community and can be controlled to an acceptable level. However, traditional production is disappearing and cash crops grown with the help of synthetic fertilizers, pesticides and machinery are gaining ground. This exposes the farmers to new occupational hazards, of which exposure to toxic pesticides is probably the greatest problem.

Studies from Sri Lanka have shown that approximately one thousand fatalities occur each year because of unsafe handling of pesticides. Extrapolating these figures to developing countries as a whole would suggest that about 220,000 fatalities are likely to occur annually. In addition,

the growing use of heavy machinery poses a risk of accidents.

Industrialization in developing countries introduces new technology and machinery, and new systems of labour organisation, wage employment and finance, and along with this, additional occupational problems. Industrial workers in developing countries are generally first generation workers with little theoretical knowledge or practical experience in the work process. They may have serious problems in understanding technical instructions, and no knowledge or experience of the occupational risks.

Occupational hazards in developing countries are largely uncontrolled. There are few reliable statistics describing their incidence, but surveys do suggest that the problems are considerable. A high risk of accidents and diseases, coupled with poor living conditions for a large part of the working population, results in high levels of illness, sick periods with accompanying loss of pay and, eventually, unemployment, disablement, and death. Limited benefits result from economic development initiated by this industrialization to the labourers. Requirements such as health facilities (toilets, washing facilities, eating places, drinking water, and sometimes housing and transportation), and good working conditions (minimum working hours and salaries, sick leave, maternity pay, regulation of overtime, and women and child labour), as well as technical control measures, are all essential.

It is important to consider the difference between large and small enterprises. In many developing countries, large enterprises are established with assistance from industrialized countries. They are often well planned and local staff training is included. During this early phase it should be possible to control occupational hazards so long as it is recognized as a priority by both management and workers. Machinery can be provided with safeguards, ventilation and other essential equipment, and staff can be trained in occupational health and safety. In many cases problems will arise after the establishment of a plant as safe operating practices adapted to local conditions have not been established.

Problems may be even more severe in small enterprises. The main part of industrial development in many countries actually takes place in small enterprises involving the majority of labourers. There may be too much staff and too many machines in limited space. Equipment is often old and without adequate safeguards. Where safeguards do exist they are often very poor and are frequently neglected by employers to compensate for low productivity and by workers to compensate for low salaries.

The worker's role and conditions are dependent on the employer. So it is essential for the worker to be organized in labour unions in order to gain influence over his own employment conditions and to participate in controlling occupational hazards. Labour unions organize only a small portion of employees in developing countries, and union membership is often confined to large private enterprises and state employment.

Many families subsist on income generated by their members as tailors, shoeshiners, stall owners, and market traders. Self-employment accounts for a large part of occupation in developing countries with special working environments. There is also an increasing tendency, for example in Asia, for employers to make use of workers based at home, putting pressure on the women and children who carry out subcontract work under bad conditions.

Finally, occupational health hazards in the kitchen should be mentioned. Burns from fires and stoves, and scalding from boiling water or food are major risks to women and children. Exposure to hazardous emissions from burning of wood, charcoal and cow dung indoors is probably the single most important occupational health hazard for women. The consequences are chronic obstructive pulmonary diseases and nasopharyngeal cancer. In a WHO report from 1984 it is estimated that women who cook on open fires in closed rooms are inhaling as much Benzo-a-Pyrene (a carcinogen), as if they smoked 20 packs of cigarettes a day. In many situations, infants and children are also at risk. A conservative estimate is that 300–400 million people are exposed to such a risk worldwide.

4. Food Production and Nutrition

4.1. Food Production and Distribution

The ongoing increase in population demands a corresponding increase in food supply, but the average surface area of agricultural land per farmer is on the decline in most countries in the developing world. Also, an increasing concentration of land in the hands of fewer farmers constrains the access to land to the rest of the rural population. As absentee landlordism becomes more common less productive land use replaces more intensive forms.

The only way to reverse this undesirable trend is to increase crop yields, if resorting to imported foodstuffs is to be avoided. This can be achieved by improved cultivation methods, the use of crops and animal breeds with a higher yield, and an expanding use of pesticides and fertilizers. Improvements in the storage of food crops and animal products are also of great importance.

Methods of industrialized agriculture known and used in the developed countries have been exported to the developing world under the name of "the green revolution". The main element of the green revolution is the use of high yield crops which are able to absorb three to four times the amount of nutrients normally absorbed. This results in larger harvests if the climatic conditions are ideal and no diseases invade the crops. However, the high yield species are often vulnerable to disease and chemical pest control has accompanied their introduction. The intensive use of pesticides and fertilizers may be a threat to human health, but the amount used in developing countries is still far below that of the industrialized nations.

The major health problem arising from the use of pesticides in developing countries is the acute and sub-acute poisoning which results from repeated exposures during pesticide application. However, pesticides and other agricultural chemicals can also result in serious cases of poisoning when food becomes contaminated with the hazardous agents. This can result from mis- or over-use, post harvest treatment to avoid problems with insects and rodents, or from accidental contamination of food and drinking water. An example of mis-use occurred in Iraq in 1971–72 and involved the fungicide methylmercury. Methylmercury is used to treat grain against seed-borne

fungal diseases, and at that time the farmers used the treated grain to produce flour for breadmaking instead of sowing. After eating the bread for some time 6,000 people were affected, 500 died and many became chronically ill with severe disturbances of the nervous system. While the acute toxic effects of pesticides are easy to recognize, it is difficult to evaluate the health impact of a more long-term exposure through pesticide contaminated food.

Heavy use of fertilizers also creates the possibilities of groundwater contamination. For instance, high levels of nitrate have been detected in groundwater in several developing as well as industrialized countries.

The use of drugs against disease, or for promoting growth in domestic animals, may present a problem if the animals are slaughtered or the milk used before all traces of the drug have been eliminated from the body. Antibiotics can cause severe allergic reactions, and resistant strains of bacteria can spread into the environment or accumulate in the consumer. The effects of ingesting traces of growth hormones or other growth promoters are largely unknown.

The danger of food poisoning increases when people migrate from rural to urban areas and need to take food with them over long distances or store it for later sale. Poor standards of hygiene and high temperatures in connection with slaughtering, harvesting, transporting, storing, processing and selling food can result in contamination with viruses, bacteria or parasites, and favour the growth of bacteria and fungi. Food poisoning and long-term toxicoses can occur when such food is consumed, because both pathogenic and non-pathogenic bacteria and fungi can create toxins, some with lethal effect (like botulinum toxin) or others which are carcinogenic (aflatoxin).

4.2. Nutrition

The negative side of nutrition, malnutrition, may be understood in terms of failure of body functions, resulting from the intake of too little, too much, or incorrectly balanced food. Malnutrition is determined by physical and social surroundings such as climate, soil, settlement and population balance, as well as by economy and policy. An important health aspect of malnutrition is an increased susceptibility to other diseases.

Malnutrition is a major and increasing health problem in East Africa and South Asia. Surveys in these areas show that children under five are moderately malnourished in 15–30% of the cases and the same percentage of newborn

infants have lower than average birth weights resulting from malnutrition during pregnancy.

Most tropical countries experience a seasonal pattern of rainfall, where the rainy season is often the most critical time of the year in terms of health. The beginning is a particularly stressful period when food shortage is combined with a high energy demand for field work. Exposure to infection is most pronounced and death rate highest during the rainy season. The frequency of disease can have great bearing on the capability of the labour force and hence on the amount of food produced. Conversely, an overall decline in rainfall can result in major drought-related famines, such as have occurred in the drier parts of the African continent since the mid-1960s.

The importance of soil fertility and conservation is clearly recognized by most farmers in the tropics, yet they often are forced by their own governments or by demands of the developed nations, to replace the traditional "balanced" system by others which either reduce soil fertility or require a high labour and material input to maintain productivity and a fertile soil. In warm and humid climates biological processes happen very quickly, and soils are rapidly depleted of their nutrients. As a result of this, yields may decline. As increasing populations require increasing amounts of food, farming expands into marginal areas of land. This may lead to deforestation, and soil erosion and, eventually, lowering of land productivity.

Traditional agricultural systems are characterized by mixed and phased cropping which ensures a regular food supply throughout the year. However, the need to feed the rising urban population and to earn foreign currency has put pressure on governments to promote cultivation of cash crops for the urban markets and for export. Changing from traditional subsistence crops to non-subsistence cash crops such as maize, coffee, cotton, sisal and jute, has had a significant effect on people's diets in rural areas. Production of local food crops has been reduced to the detriment of food security, and often government regulations ensure that the prices paid to the farmers for the cash crops are low.

5. Water Resources Management and Sanitation

5.1. Water and Sanitation

In 1980 WHO estimated that 80% of all diseases in the Third World could be attributed to the lack of safe water supply and basic sanitation. It is estimated that diarrhoeal diseases alone are responsible for the deaths of 15 million children under the age of five each year.

Diseases related to water can be divided into those caused by a biological agent (a pathogen) and those caused by a chemical agent in the water. The second group includes diseases caused by high levels of fluoride and nitrate in drinking water. These water-chemistry-related diseases, although potentially serious, are totally overshadowed by the water-related infections caused by a pathogen.

Water-related infections can be divided into four groups, organized according to their transmission routes: water-borne diseases, water-hygiene diseases, water-based diseases (the pathogen spends a part of its life cycle in an aquatic animal), and water-related insect vector diseases (diseases spread by insects which either breed in water or bite near water). The last two are dealt with in section 5.3.

Water-borne infections are those in which the pathogen occurs in water, and when ingested in sufficient doses, infects the drinker. The majority of these pathogens reach the water through contamination with human excreta and ultimately enter the body from the water orally, in the form of "faecal-oral transmission". However, many faecal-oral diseases are readily transmitted by other means, such as contaminated food or by hand to mouth. Belonging to this group are the bacteria causing enteric fevers, gastro-enteritis, bacillary dysentery and cholera, the viruses causing infectious hepatitis and poliomyelitis, and the parasites causing amoebic dysentery and giardiasis.

The conditions which favour the transmission of these diseases are different in rural and urban areas. In rural areas the only water sources are often natural water bodies where the water is used for all purposes: washing clothes,

bathing, watering animals, and for drinking and cooking. These water bodies may be highly contaminated with animal and human excreta. Open wells, with either poorly constructed headwalls or none at all, are contaminated by the filthy containers and bucket ropes used to haul up the water, and by polluted water running back into the well. In urban areas leaking or overflowing sewers, combined with low pressure and leaking pipes cause contamination of water supplies. Common to both environments is the lack of hygiene in the homes. Several studies have shown that water stored at homes is heavily contaminated, irrespective of the quality of the source. Filthy uncovered containers and the habit of pouring water by dipping scoop and hand in the water jar is part of the explanation.

Often slum and squatter areas are situated on steep slopes, or in swamps or river beds which are prone to flooding during heavy rains. There is no water supply, and no waste or garbage disposal system. Most people defecate in the open, and in slum areas diseases related to water and sanitary conditions occur frequently.

Water-hygiene infections depend on the quantity of water used, rather than its quality. A water-hygiene disease may be defined as one whose transmission will be reduced following an increase in the volume of water used for hygienic purposes, irrespective of its quality. These diseases include many of the faecal-oral transmission diseases also listed as water-borne, but the typical infections belonging to this group are different eye infections, bacterial skin sepsis, fungus infections of the skin, and louse-borne infections. Factors which facilitate the transmission of these diseases are crowding, sharing of clothes and beds and scarcity of water. It is therefore not surprising that the prevalence of eye diseases in households with tap water, is significantly lower than in houses situated away from the water source.

All the above mentioned water-borne infections are also excreta related infections, but there are some infections which are solely related to human excreta, such as the soil transmitted helminths and the beef and pork tapeworms. In rural areas where people defecate in the open the pathogenic agents from the excreta are spread in the environment by people and animals.

Improvements in excreta disposal will limit the transmission of the above mentioned infections, but if a latrine is poorly maintained and the floor becomes soiled, it becomes a focus for transmission. Taboos surrounding sanitation in most cultures often make the subject difficult to discuss and mobilizing a community for a sanitation

programme a difficult task, which requires tact and a thorough cultural understanding.

The main trends in development projects have been to implement safe water supply only. However, as most water-related infections and all excreta-related infections have other transmission routes than the one which can be controlled by the implementation of safe water, it has been difficult to see the impact of these projects on health. Now there has been a change towards provision of both water supply and basic sanitation, but it is necessary to encourage a hygienic environment as well, through the implementation of garbage disposal systems, drainage systems, and through education to change the attitudes and habits of the local population. While water and sanitation projects contribute positively to health improvement, people tend to gather round these facilities and the resulting pressure on the environment will inevitably increase with potentially serious consequences.

5.2. The Re-use of Organic Waste Products

Organic wastes from human activities comprise mainly bodily excretions and household waste. The growth of human population and the development of large urban settlements make the increasing amount of waste a problem to both health and environment.

Organic waste added to the fields replenishes the soil with organic matter. Mineral fertilizers do not improve or maintain soil structure in this way. These facts are now being recognized by external advisers and more emphasis is put on agricultural practices which ensure organic matter recycling. Alternatively, organic industrial and household waste can often be used for animal fodder or soil improvement and involve less hygienic risk than the re-use of human excreta.

In many rural societies human and animal excreta have traditionally been used on a small scale as fertilizers and for feeding fish and animals. However, in re-using excreta there is a risk of spreading viral, bacterial, protozoan, and helminthic infections. Stored and otherwise treated excreta are generally safer to use as fertilizer. Contamination of root crops and vegetables with pathogens represents a major problem, and leaching of pathogens to ground or surface water may occur if application is followed by heavy rainfall. Pond fish fed on human excreta may transmit certain trematode infections to man, and feeding swine with

human excreta can lead to the transmission of meat-borne parasitic infections.

In China the major part of human excreta is re-used, while in Islamic cultures human faeces and urine are regarded as spiritual pollutants and are therefore not re-used. Constraints to the re-use of human excreta also commonly occur in many parts of sub-saharan Africa.

Composting of organic waste is, when properly managed, an efficient and low cost/low technology method of transforming the waste into a valuable fertilizer. It has furthermore an inhibiting effect on the pathogens due to the high temperatures created in the process. The product of waste water treatment plants, the sludge, will contain the full range of pathogenic microorganisms present in the raw excreta, as well as heavy metals and other toxic compounds originating from industrial waste water. This limits the possibilities for re-use of sludge in agriculture.

5.3. Vector-borne Diseases

Vectors are insects or snails that facilitate transmission of infectious organisms from one vertebrate host (like a human being or domestic animal) to another. A period of time for the infectious organism to develop in the vector is essential before transmission can take place. The infectious agents causing vector-borne diseases may be viral (for example, yellow fever, dengue, Japanese encephalitis), bacterial (for example, plague, typhoid fevers, relapsing fevers), protozoan (malaria, sleeping sickness, leishmaniasis) or helminthic (schistosomiasis, onchocerciasis, lymphatic filariasis, Guinea worm disease). The most important vectors of human diseases are various species of biting dipterans (mosquitoes, flies), lice, fleas, ticks, freshwater fleas, and freshwater snails. A detailed knowledge of the biology of the vectors is needed to understand the epidemiology of the diseases they transmit and to establish measures to prevent and control the spread of these diseases.

Today, most vector-borne diseases have their widest distribution and highest incidence in tropical developing countries. Five out of the six groups of diseases included in the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR) are vector-borne diseases: malaria, schistosomiasis, trypanosomiasis, leishmaniasis and filariasis, and it is estimated that more than 800 million people in tropical countries are affected by these diseases.

Vectors will usually be present when favourable habitats and climates are present. Human activities often create new vector habitats and recent development projects have in several ways affected the distribution and incidence of many human vector-borne diseases.

Construction of irrigation schemes and large freshwater dams for hydro-electric power has created large, ideal habitats for vector snails of schistosomiasis as well as for vector mosquitoes. People have migrated on a large scale to the new sites, in order to obtain employment in the irrigation schemes, to work as fishermen in the man-made lakes or canals created by the dams, or to engage in trade. Overcrowding, often under poor hygienic conditions, around the new vector habitats has led to an explosive transmission of schistosomiasis, as well as malaria and other water-related diseases. No preventive measures have been taken because of financial cost: if the schemes took responsibility for these implications they would make less of a profit.

Water and sanitation projects usually lead to reduced prevalence of diseases transmitted by the faecal-oral route, but at the same time they may contribute to increased transmission of vector-borne diseases. Some *Culex* mosquitoes, transmitting bancroftian filariasis, breed in heavily polluted water, including wet pit-latrines. Large-scale building of pit-latrines in cities and villages has often led to an increase in the transmission of this disease. Open sewage systems, and polluted water in general, also favour the breeding of *Culex* mosquitoes. A safe water supply (in outdoor standpipes, or bore-holes with or without pumps) without the possibility of draining unused water from the ground surface, creates surface water bodies around the water source, where snail vectors of schistosomiasis and mosquitoes can breed. Although a safe water supply and better sanitation are important long-term means of reducing transmission of schistosomiasis, the need to build and use these facilities properly must be understood by the target population, as well as by the planners, in order to get control of this disease effectively.

In urban areas, open burrow pits left behind after construction of houses, roads and railways may become important breeding sites for freshwater snails and mosquitoes. Pools of water in garbage and small containers such as empty tins, bottles, plastic bags, coconut shells and used tyres, serve as breeding sites for mosquitoes transmitting arbovirus and, in some areas, lymphatic filariasis. The rapid growth of slum areas in tropical cities, with human crowding and poor hygienic conditions, favours the multi-

plication of lice and fleas, and thereby the transmission of typhus, relapsing fever, and plague.

Several vector-borne diseases may be regarded as occupational diseases. Farmers working in valleys near rivers and streams are exposed to blackflies transmitting onchocerciasis. West African sleeping sickness prevails among fishermen and ferrymen working on rivers infested with tsetse-flies. Settlers, hunters, tourists and game wardens entering new uninhabited or sparsely inhabited land are exposed to many of the zoonotic vector-borne diseases like arbovirus, tick-borne bacterial infections, East African sleeping sickness, and leishmaniasis. Canal cleaners in irrigation schemes run a very high risk of acquiring schistosomiasis. Rice farmers in China and South East Asia are exposed to Japanese encephalitis.

Humans may carry vectors and/or infectious agents from one area to another and increased human travel is often responsible for the rapid spread of vector-borne diseases to new areas.

It appears that recent development has often favoured the spread of several vector-borne diseases. One exception, however, is brugian filariasis in parts of South Asia. Increased pollution of freshwater bodies has led to a decrease in the number of habitats for mosquitoes (of the genus *Mansonia*) transmitting this infection, thereby causing a reduction, and in some areas such as Sri Lanka an almost complete eradication of this infection. The habitats are instead taken over by *Culex* mosquitoes transmitting bancroftian filariasis!

6. Mental Health

Psychiatric illness has been relegated to an insignificant place in modern health systems in the Third World, yet there is no reason to believe that there is a significant difference in the frequency of mental disorders or major psychiatric illnesses between the developed and developing countries. On the other hand, certain disease patterns vary according to the social, cultural, and physical environment. Mental illnesses caused by infections of the brain (viral encephalitis, cerebral malaria) and brain damage resulting from the lack of proper obstetric care and malnutrition are more frequent than in industrialized countries. Epilepsy is regarded as a psychiatric disease in many developing countries. In Tanzania epilepsy is three to five times more frequent than in Denmark, and the higher incidence is assumed to be a consequence of meningitis, cerebral malaria, and birth complications.

Undoubtedly the most serious psychiatric illness is schizophrenia, but the social prognosis is better in developing countries. Here the social family network is stronger and therefore more capable of absorbing deviant behaviour. Also, the reduced working capacity of schizophrenic patients can be better utilized in agricultural societies, which most of the developing countries still represent.

Depressive illness is a frequent occurrence in developing countries. The burdensome life of women, coupled with the stresses of large and often sick families, provoke depression for which treatment is not easily available in the villages. In the cities stress leads to depression and suicide, which is not uncommon. Alcohol and drug abuse are other serious problems which are frequently associated with social uprooting, rapid urbanization, migration, and unemployment.

7. Administrative, Legislative, Financial, and Educational Constraints

7.1. Health Systems

Usually only two major systems of medicine with different concepts of health are discussed – the modern and the traditional. These have undergone separate developments and come up against each other throughout history. Traditional medicine, with its bearing on mental and social well-being in many societies, cannot be ignored. It has been described as "empirical, holistic, and synthetical", and modern medicine as "rationalistic, technical, and analytical".

The introduction of modern medicine in developing countries, specifically drugs and vaccines, is the main factor in the decline in child mortality and the increase in life expectancy between 1950 and 1985. The "western" curative medical approach, however, has given the public an overwhelming faith in drugs which is not only a threat to health development but an environmental hazard as well. Some drugs are used inappropriately, particularly when others with fewer side-effects are available. Doses are often too high or too low, sometimes the drugs have been falsified, or have long passed the use-by date. When drugs are misused, health hazards extend beyond the individual and the community and become a major environmental hazard. Excellent examples are malarial resistance to chloroquine and bacterial resistance to tetracycline, resulting from inappropriate use of these drugs.

Decreased mortality may be achieved by modern medicine but it is not necessarily accompanied by a parallel reduction in disease. The latter is related more to the profile of poverty, with slow income increases, growing unemployment and no improvement in housing, safe water supply, or sanitary conditions. Persistent reductions in the occurrence of disease require overall economic development, supported by political activity, to encourage adequate community educational and health systems.

The relative isolation of expensive and mainly curative hospitals from the broader health problems of the community has prompted a change of health strategy towards primary health care systems. The Chinese experience, which highlighted the central role of community medicine and village health workers, and the benefits of working hand-in-hand with traditional medicine, provided the background for the primary health care strategy of "health for all", adopted by WHO in 1979. According to the Alma-Ata document of 1978, primary health care is essential care based on practical, scientifically sound and socially acceptable methods and technologies, made universally accessible to individuals and families through their full participation, and at a cost which the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination. Primary health care forms an integral part of the country's health system, of which it is the central function and main focus, and of the overall social and economic development of the community. It is peoples' first level of contact with the national health system, bringing health care as close as possible to where they live and work.

Practically all countries in the Third World have elaborated their own national health strategies based on the primary health care system. Several countries have developed village health worker programmes, and have put them into operation to varying degrees. Fewer have established an official framework for traditional medicine, despite its extensive use. Estimates of as much as 80% of all health services being covered by the traditional sector are not uncommon, despite the fact that such services are not free, which only underlines the importance of cooperating with the traditional sector.

There are numerous constraints in putting the primary health care strategy into practice. Some health professionals are unwilling to understand the cultural questions or the theory behind the strategy; communities are often quite a distance from the offices of health system bureaucrats; there are few political, social, and economic benefits connected with the strategy as political strength lies in the "developed" urban areas. This is compounded by the inadequacy of resources, management capacity, and of clinical referral in the health system itself.

7.2. Education

The often causal relationship between education and development, and between poor education and health problems, is widely recognized. Education must be considered one of the crucial agents for economic growth and health improvements. However, education can not operate in a social vacuum and institutional arrangements must correspond to the wider social framework which sets the limits for planning and reform. The creation of a social group of unemployed, well educated people by formal schooling may be a serious problem, and it has been suggested that formal education is irrelevant to the needs of developing countries since it fails to meet the demands of the poor majority. One of the reasons may be that school systems, having been copied directly from those in the "so-called" developed countries, are not suitable for the needs of the developing countries.

Regarding health issues, non-formal and informal education may be in a better position to pass on information. Non-formal education means educational activities which occur outside the school premises. Informal education includes all forms of non-school experience and is a life-long process of acquiring knowledge, skills, attitudes, and insights. The education of women is central to population control, infant mortality and child nutrition.

The choice of the most appropriate type of teaching is essential, and a range of health education approaches exists. Strategies to cope with essential health problems must comprise an interdisciplinary approach with the starting point in community participation and health education. Neglect of this fact may be the reason for the slowness of development towards better health conditions.

Local knowledge of the environment is also important in this context. The farmer is an attentive observer and shrewd analyst of his own difficulties, and research into traditional knowledge of the environment should proceed all outside educational initiatives. These should be considered as a two-way process where local, traditional, environmental knowledge is paired with "modern" scientific medicine.

7.3. Legislation

At independence most developing countries adopted the left-over colonial legislation, and as a result, laws were commonly isolated from the society they were meant to serve and often far removed from reality.

Although developing countries have often attempted to pass laws preventing some of the health problems discussed in this paper, many laws concerning health and the environment have been kept more or less unchanged since independence and are therefore completely outdated and unable to cope with modern developments. Lack of resources to enforce legislation makes it meaningless, since few will obey a law which is not enforced. Updating legislation, capable administration, surveillance measures and reporting systems are all essential for legislation to be of any practical use. Legislation concerning major topics such as pollution, occupational health, transportation and food hygiene is essential but often extremely difficult or impossible to implement, owing to the lack of resources and information. Weakness in the legislative system stemming from corruption is also a substantial problem in many developing countries, as in many so-called developed countries.

It is usually not within the power or wish of the donor agencies to interfere with the political legislation in developing countries, but through a selection of development projects they could create more awareness of environmental aspects. The WHO Regional Office for Europe has published a book on health legislation in the European Region. Similar books for the other Regions would help to focus on these problems and might provide useful guidelines.

7.4. Financial Resources

The political commitment in developing countries has been to establish a freely accessible health system for all. However, stagnant economic growth and the world economic recession in the 1970s and 1980s put severe limitations on national budgets. Health ministries covering an "unproductive" sector were especially hard hit and budgets were cut dramatically. Health budgets in developing countries often represent only 1–5% of the total national budget and the emphasis on building large ambitious hospital units in the past has drawn upon a disproportionately large share of the resources. Faced with this situation the central aim must be to alter existing health systems to achieve a more effective coverage at national level.

As low-cost health systems based on the primary health care approach will reach more people, available funds should be reallocated to peripheral parts of the health system, so that there is less emphasis on prestigious central units such as major hospitals, and a more rational use of

available resources, including training systems to ensure qualified staffing.

Economically this approach might take its starting point in reconsidering the ideology of free services and realizing the need to mobilize the community to be responsible for its own local health system (construction, maintenance, local salaries) to a greater extent than before.

The possibility of raising the necessary financial resources to develop effective health systems depends to a large extent on international economic relations. The overwhelming debt burden in developing countries and the adjustment policies of the World Bank and the International Monetary Fund, implying drastic cuts in public expenditure including the health sector, represent major economic constraints to the development of effective health systems. Very often aid agencies will be of central importance in the build-up phase of these health systems. It is therefore essential that the systems can be sustained in a national context after the withdrawal of foreign economic resources.

Section II: Review of Experience Gained in Solving Environmentally Related Health Problems

1. Introduction

Recent development processes have led to recognizable improvements in quality of life. However, as the previous section has illustrated, these processes have also created significant environmental problems that markedly affect the health of the people involved. Major environmental hazards are linked to the increase in population, urbanization, the industrialization process, and to changing systems of agricultural production. There are serious consequences: uprooting of cultures, new hazards at work, pollution of air, water and soil, and increased likelihood of disease.

The previous section discussed the most significant constraints to solving health problems related to the management of natural resources and the environment. Central among these are lack of financial and other resources, failure to identify the problems, inappropriate legislation, lack of community involvement, and lack of commitment at different political and administrative levels.

The efforts of the aid organisations have centered on constructing hospitals and clinics, birth control programmes, providing safe water and sanitation, and setting up immunization and essential drug programmes. Recent years have seen action within the framework of the primary health care approach, with less emphasis on creating a centralized health system.

This section is an overview of recent approaches and experiences in solving environmental health problems which have been exacerbated by recent developments.

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2. Disease-specific Control Programmes

Disease-specific vertical control programmes have been the most commonly applied approach in the past to the control of vector-borne and other infectious diseases such as smallpox or tuberculosis. They were usually based on the intensive use of a single effective drug or vaccine, over a wide geographical area. Special institutions or departments dealt with control of the specific disease, training, and supply of equipment and transport. There was little if any collaboration with other sectors in the health system, and the programmes paid lip service to public education, community participation, and preventive measures. In extreme cases, personnel entered programme areas without prior notice, to carry out their control work in almost military-like actions.

The most successful disease-specific control programme was the one against smallpox in the 1970s which succeeded in eradicating the disease. This success was due to the availability of an extremely effective vaccine which gave life-long immunity, the very distinct clinical symptoms of the infection which made it easy to trace and diagnose, the well organized programme, international finance, and the fact that human beings are the only source of infection.

Control programmes for vector-borne diseases have shown less promising results. The appearance of DDT on the market after the second World War, as a cheap, effective insecticide, led to great optimism that malaria-bearing insects could finally be controlled. Large spraying campaigns in the 1950s and 1960s, such as the WHO programme, reduced transmission significantly in many parts of the world, with the exception of Sub-Saharan Africa. However, increasing logistical problems, costs, and the emergence of DDT resistent strains of mosquitoes, caused overwhelming problems in malaria control campaigns, and in the 1970s malaria returned to many of the areas which had earlier been freed from this menace. Since then, new insecticides have appeared on the market, but most of them are more expensive and more hazardous to handle than DDT. Experience has also shown that vector resistance usually develops anyway after periods of intensive use. In 1986, WHO reported that 137 species were resistant to

one or more insecticides and the falciparum malaria situation has been further complicated by the development of parasite resistance to almost all known anti-malarial drugs. In addition DDT has been identified as an environmental hazard because of its slow degradability and because it can be accumulated in food chains.

In 1974 a large international effort against river blindness, the UNDP/FAO/World Bank/WHO Onchocerciasis Control Programme, was initiated, involving 11 countries in West Africa. All rivers and streams in the area were to be sprayed from the air with larvicides against the blackfly vectors, every week. It has had success in reducing, and even stopping, transmission of river blindness in vast areas of West Africa but today the programme is faced with serious problems of vector resistance, invasion of blackflies from other areas, and high costs. Unless these problems are solved, river blindness may soon return and become a serious problem again in these countries.

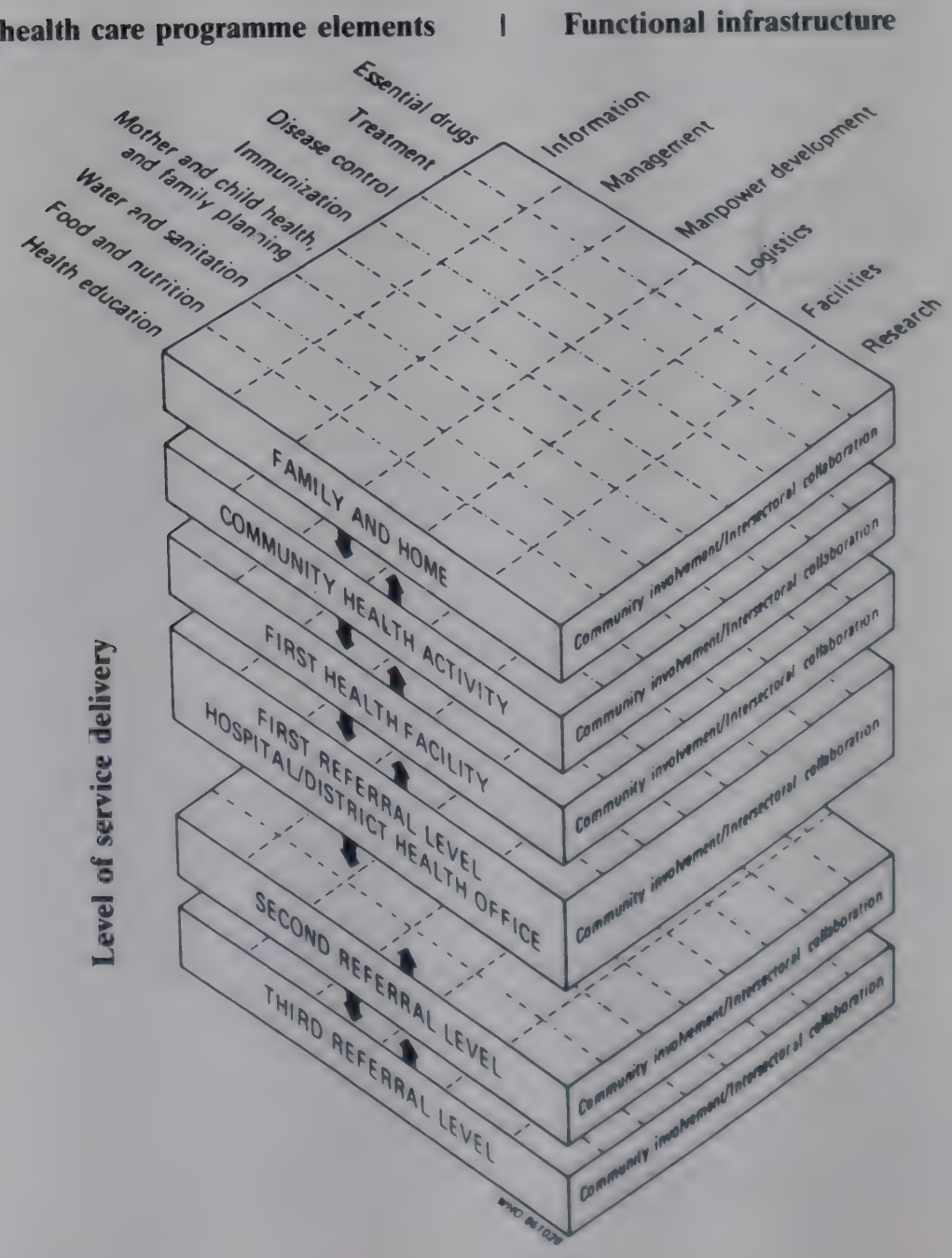
In the case of schistosomiasis, control in the past was based almost solely on reducing the number of vector snails through the use of chemicals. Several programmes were able to control schistosomiasis transmission with molluscicides for a limited period (in Brazil, St. Lucia, Ghana, and Egypt for example), but the freshwater snails return and transmission continues if correct molluscicide application is interrupted or ceases altogether. Today there is only one available chemical agent, and that is niclosamide (Bayluscide), since many of the molluscicide compounds previously used are now considered ineffective or environmentally unacceptable. The development of new and safe drugs against schistosomiasis has recently resulted in a change of strategy towards mass chemotherapy. Despite this, resistance to some of the drugs has already been reported, although not yet against the most important drug, praziquantel.

The lesson learned from disease-specific programmes designed to control vector-borne diseases which are based on drugs or pesticide application, is that they can be highly effective in the short term, but long-term effects are often limited. Drug resistance is a fundamental problem which is difficult to tackle, and unless total eradication can be achieved, the programmes will have to continue indefinitely, at an unacceptable high cost.

3. The Primary Health Care Approach

Lack of success with vertical disease control programmes and the obvious shortcomings of centralized health systems, combined with the experience of barefoot doctors in China, have provided background and inspiration for introducing a primary health care approach to disease control and prevention.

In one of its publications, WHO has illustrated a model of a comprehensive health system based on the principles



of primary health care (see figure below). It shows 1) the various elements of primary health care (PHC) and 2) the necessary infrastructures, stressing the importance of community involvement and collaboration between different sectors at 3) all levels of service delivery. The complexity of this model may explain why it is not easily adaptable in all countries.

Until now, relatively little experience with primary health care has been gained. However, smooth running primary health care, has been central to success or failure of integrated programmes for the control of tuberculosis, leprosy and malaria. Whether or not the primary health care projects achieve the necessary efficiency depends, among other factors, on the level of community participation and commitment, and on an adequate distribution of resources. Another factor still open to debate is the employment and educational status of the primary health care worker.

Experience has also revealed the dangers of drawing up a strategy which is too comprehensive. Over-ambitious programmes tend to be too costly or unoperational in the long term, because the infrastructure which the strategy calls for does not exist. It is more appropriate to draw up a modified version of the primary health care strategy, emphasizing specific health problems. Definitive conclusions regarding the efficiency of these modified strategies are not yet available, but present experience suggests that success depends on adapting to an actual regional situation. All the same, modified PHC programmes should not preclude the comprehensive health care system suggested in the first place, which has obvious long-term benefits.

4. Integrating Environmental Health Issues into General Planning, Education and Information

Developing countries have paid limited attention to the relationship between the environment and health, reflected by their failure to recognize the importance of integrating environmental aspects into development process. Collaboration between sectors, training in ecology and health issues, and a mobilization of public opinion in general are necessary to reverse this trend. It is imperative for all project planning to include an evaluation of environmental consequences, so as to avoid some of the errors which have occurred in the developed countries.

There generally isn't enough information regarding environmental influences on health in the majority of developing countries. New approaches to human ecology must be incorporated into future health education and the interaction between biological and environmental factors which affect and determine ecologically sustainable development strategies must be taken into account. This knowledge must be incorporated at the highest levels of the educational system and attempts must be made to avoid a too popularized approach to ecology and environment. The protection of wild game animals, while undeniably important, reflects only a fraction of the total pressure which development puts on the ecological balance. Emphasis must be put on applied ecology at the expense of theoretical ecology.

Integrating environmental issues into general planning is often complicated by having to balance economic growth with human health. The political and economic pressure for a proper balance is still too weak in the industrialized world, and the situation is even more pronounced in developing countries.

The majority of developing countries have no critical press and frequently lack the professional capacity to deal with the environmental issues related to human health. The fact that public opinion is not granted the essential access to the media is yet another obstacle to putting pressure on officials.

5. Institutional Strengthening

The need to establish a network of effective institutions in developing countries to survey and monitor environmental issues related to human health is critical. There is a need for education and research to provide data on health, the environment and their interrelationship, but also for institutions whose primary aim is to make information accessible to the general public. It is essential that these institutions have their base at local level so that they can reach their target groups.

A growing interest in health and safety at work has evolved in many developing countries, and assistance in support of institutional strengthening has grown rapidly. Efforts by the International Labour Organisation have helped establish national institutions in India and Thailand dealing with working conditions and occupational health. But there are a number of developing countries where no such capacity exist.

Education is central to passing on knowledge and skills within the health sector, in developing countries. Courses should as far as possible be collaborative with more relevant content and a chance for local staff to contribute. As long as there are insufficient research and training facilities, training will have to take place in institutions in the developed countries. Institutional strengthening through collaboration should ensure that these facilities exist in both worlds.

Institutions in developed countries must have a thorough knowledge of specific scientific aspects as well as the political, cultural, and economic conditions in the developing countries they are collaborating with. In turn, existing institutions in developing countries should reorientate their programmes towards relevant topics or new institutions should be established to deal with them specifically. Development agencies could contribute to this process.

Danish institutions have been involved in institutional strengthening in developing countries, as in the case of the collaborative activities between the Royal Danish Veterinary and Agricultural University and Sokoine Agricultural and Veterinary University in Morogoro, Tanzania; between

the Danish Bilharziasis Laboratory and a range of health institutions in Sudan, Kenya and Zimbabwe; and between the Institute of Seed Pathology and various institutions in developing countries. This collaboration ranges from building up entire teaching units, to the support of individual research projects. Previous students from the Danish Bilharziasis Laboratory are now in central positions in many schistosomiasis control programmes in Africa. In addition, governmental institutions backing up these activities have been significantly strengthened with regard to their expertise within relevant fields through collaborative links with the Danish Bilharziasis Laboratory.

It should be emphasized that the best results are achieved when the institutional strengthening is linked to one or several, large or small, development projects. Institutional strengthening is a waste of time if there is subsequently no chance to use the skills and experience which have been acquired.

The UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR) is a programme with much emphasis on institutional strengthening. Institutional grants, training grants, and grants for visiting scientists have been offered through this programme. During the period 1975–1984 a total of 640 grants were awarded, representing a value of approximately 50 million US dollars (Danida contributes substantially to this programme). The main emphasis in the programme has been put on biotechnologically advanced approaches to disease control. However, the disease pattern in a given community should also be seen in the light of prevailing economic and social conditions. A more balanced approach to disease control in these institutional strengthening programmes, combining the biotechnological and epidemiological approaches, is therefore essential. The health sector should be open-minded towards introducing new technology which stems from biotechnological progress, but on the other hand it should realize that biotechnology alone cannot provide the definitive solution to health problems in developing countries. These considerations also provide the background for decisions to strengthen existing research institutions or to build up new capacity to study the relationship between human health and the management of natural resources and the environment in developing countries.

6. Technical Approaches

Technical developments have had an important influence on human health, both directly through the development of drugs and vaccines, and indirectly by contributing to economic development and improving living standards. Technological progress has also had adverse effects on human health, through the creation of new forms of health hazards at work, the possibility of accidents associated with new technology and new forms of pollution. It should be borne in mind that the biggest obstacle to improving health in the poorer countries is generally not the lack of technology, but the inability to reach people with the necessary services.

Technological development is dependent on research and the existence of an economic background which allows results to be used. Most technical developments, therefore, take place in developed countries and are often not appropriate for the developing countries. Within fields such as physiology, biotechnology, engineering, and agriculture, however, recent development is likely to be of some benefit to improving health in developing countries, but again, resources will not reach target groups unless the gap between the urban and rural sector is bridged. In the developing countries, technical research is often regarded as a status symbol by both university graduates and technicians. Financial support is sought for "high-tech" equipment which not only is difficult to maintain properly but also demands time consuming scientific training.

Transferring new technology to developing countries requires care in ensuring that the technology is appropriate to the needs and conditions of the people it is meant for. This means that there should be a thorough identification of local needs, worked out beforehand with the local population. The necessity also of addressing the need to educate and establish local organisations which can take over responsibility should be reflected in the technology package delivered.

7. Concluding Remarks

The mechanisms of development processes as well as the relationship between health and environment are very complex. As long as this complexity is recognized, there is a starting point for development which maintains and improves the quality of life on earth. It must not be forgotten though that a range of problems such as natural disasters or wars between nations, populations and individuals pose significant, though not insurmountable challenges to achieving this goal.

The most pressing environmental problems are of a global nature and must therefore be dealt with by the international community through the United Nations and other international organisations. If global environmental issues remain unsolved there is little point in initiating programmes aimed at solving regional and local environmental problems. Denmark contributes substantially to these organisations and therefore should exert and achieve a much higher degree of influence on decision making than it has until now.

The complexity of the issues makes it difficult to highlight primary problems or to set up a list of priorities regarding their solution. Nevertheless, some agreements have been reached especially at global level, concerning the most pressing problems. A greater degree of cooperation among large numbers of nations is essential if both health and environmental problems are to be solved at global as well as regional levels. Among the urgent global and regional environmental problems are:

- The greenhouse effect, caused by continued increase in carbon dioxide concentration in the atmosphere released by the burning of fossil fuel and deforestation. This may result in disturbances in the overall global ecological balance and lead to an overall increase in the earth's surface temperature with a corresponding rise in water levels of the world's oceans. Apart from the ensuring loss of land and increasing frequency and severity of flooding along major rivers, the rise in temperature may also cause a shift in world vegetation zones.

- Deforestation in developing countries which results in soil erosion and degradation of the water-catchments. This leads to loss of productive soils and unfavourable changes in the availability of water in river basins.
- The depletion of the ozone layer by the release of freon gases from spray cans, refrigerators, air conditioners and production of foam and plastic materials. The resulting increase in ultraviolet irradiation has disastrous effects on animal and plant life.
- Pollution of the world's oceans, earth surface and air with environmentally harmful matters which in the long run can drastically affect human health and our capability to produce food. Harmful chemicals may accumulate in the food chain and affect human health adversely. Acid rain kills forests and lakes and degrades large areas of agricultural land. Chemical pollution directly affects the health of the population.
- The high population growth in the majority of developing countries. Irrespective of the reasons for population growth, which are debatable and often controversial, this growth represents a significant challenge to a sustainable development by increasing pressure on all environmental resources.
- The overwhelming debt burden of developing countries. Economy and ecology are linked together in the development process and unless the general economy of developing countries is improved, environmental issues related to human health will continue to have a low priority.

At local level environmental protection consists in providing the basic requirements of the population for food, fuel, housing and good health, and especially of the poorest section of the population without over-use or misuse of the environment. To achieve this goal top priority should be given to the following issues:

- Better nutrition through improved agricultural productivity on the basis of balanced use of fertilizers and pesticides. To achieve this, modern technology should be combined with local knowledge and tradition. Priority should be given to the cultivation of products for domestic consumption and to a proper balance between the production of these crops and the cultivation of cash crops for export.

- Utilization of environmentally acceptable forms of energy. The use of wood as an energy source has led to fuelwood scarcity in some areas with resulting pressure on woodland as well as on the individual who must spend more time searching for it. There are also significant and serious health implications associated with exposure to emissions from fuelwood burning.
- Appropriate solutions to slum and squatter settlements. The policy of simply clearing slum areas in and around the major cities is creating rather than solving problems. A policy of upgrading such areas by providing basic facilities, combined with establishing alternative areas for re-settlement should be adopted. Low cost solutions to the problem of water supply, sanitation and garbage disposal in such areas should be developed, and economic support given to the informal sector which may contribute to solving unemployment with which the society cannot otherwise cope.
- Immediate improvement of the general standard of health. Most diseases in developing countries are caused by lack of clean water and sufficient sanitation, so priority should be given to providing these and creating an understanding of why personal and environmental hygiene are important. This may best be achieved by supporting the primary health care system, together with essential drug and vaccination programmes. Special attention should be paid to the community based approach and to placing women centrally in any attempts to improve health conditions.

In all questions regarding the interrelationship between human health and the management of natural resources and the environment, experience should be shared and resources used to their best advantage through collaboration in training and research and dissemination of information. There should be facilities for collaborative networks, bilateral as well as multilateral, giving priority to strengthening institutional capacity in the developing world. Such networks will be of major importance for international organisations in providing the basis for necessary changes and adjustments of health policies and strategies. The networks will also be of interest to bilateral aid agencies. The impact of their programmes depends on appropriate research and the integration into national health systems.

In the planning phase of any development programme, there must be an analysis of the health component. This requires an interdisciplinary effort combining experience in

fields such as the environment, health, sociology and economics. An evaluation of the consequences to human health should be an integral component in the planning and execution of bilateral and multilateral programmes, and in the provision of loans and export credits, where Danida is either directly or indirectly involved.

Section III: Guidelines for Strengthening Environmental Considerations in Danish Development Co-operation

Background

The well-being and good health of human beings are inextricably linked to the sound management of the environment and its life-support systems. While the healthy functioning of the biosphere and its processes on the one hand are a precondition to human health, maintaining the good health of people on the other is a prerequisite to preserving or increasing their physical and psychical ability to manage the natural resources in a sustainable way.

Many developing countries experience man and climate-induced degradation of their natural resources base and disturbance of the ecological processes, which lead to deterioration of the conditions of human health. These environmental changes become additional causes of undernutrition and malnutrition, increased susceptibility to diseases and loss of physical strength, thus reducing the capability of people to produce their daily needs, let alone a marketable surplus. This environmentally related undermining of human health in developing countries occurs at a time when rapid population growth, increasing life expectancy and a decline in infant mortality necessitate expanded food production and creation of livelihood opportunities on an unprecedented scale.

Most developing countries have experienced high population growth since the second world war due to a marked decline in mortality rates and continuously high birth rates. The growing population in many countries is a serious

problem because it puts strains on the economy as a whole. In addition, the basis of health, education and the natural resources is undermined. Most countries would be capable of supporting a larger population than today. However, problems arise when the population grows too rapidly even though the absolute number of people may still be modest.

For decades developing countries have witnessed growing urbanization of their populations. The facilities available in the fast expanding cities are insufficient to accommodate the increasing population, and the mushrooming of unplanned slum settlements, without water, sanitation and other basic facilities and services, often in already heavily polluted urban areas, have created some of the most hazardous environments to human beings on earth.

Processing and storage facilities within metal and chemical industries, power plants, cement and brick works, agro-industrial enterprises, etc. cause air and water pollution. In urban areas industrial pollution and exhaust from transport vehicles and from combustion of wood and low-grade fossil fuels in domestic stoves combine to create harmful effects on human health and the environment.

Both in industry and in agriculture workers may be exposed to occupational health hazards which by far exceed those of industrial nations. Working long hours with worn-out and out-dated equipment and exposure to toxic agents with little, if any, effective safety and health regulation undermines the health of workers. In homes, particularly women and children are exposed to high concentrations of toxic emissions from indoor combustion of biomass and low-grade fossil fuels with serious implications to their health.

It has been estimated that 80% of all diseases in the Third World can be attributed to lack of safe water supply and basic sanitation. In this respect, diseases related to the occurrence of biological pathogens in water are far more common than diseases caused by chemical pollutants.

The majority of water-borne infections come from pathogens which reach the water resources through their contamination with human excreta. In rural areas, the open water bodies which often are the only sources of water are frequently contaminated with animal and human excreta. In urban areas, the state of sanitation and water supply is often such that water supplies become contaminated. The scarcity of water and crowded living-conditions of slum settlements further facilitate the spread of infections related to water hygiene.

Vector-borne diseases are most common in tropical countries, where more than 800 million people are be-

lieved to be affected. Despite impressive results achieved in vector eradication and control, human beings have created new vector habitats and recent developments have affected the distribution and incidence of vector-borne diseases in a negative direction. Thus, the creation of hydroelectric reservoirs and construction of irrigation schemes, for instance, has brought about an explosive growth in the incidence of schistosomiasis, as well as of malaria and other water-related diseases. Provision of safe drinking water without proper drainage may create excellent habitats for vectors, often in the very heart of congested human settlements. With the indiscriminate use of chemical vector control, vectors have become resistant to chemicals applied and rapid resurgence of associated diseases has occurred.

The use of modern medicine may lead to a decrease in mortality without a parallel reduction of morbidity. Morbidity is related to the economic, physical and psychical environment of people, and without real progress in the social, economic and settlement conditions of the poor, morbidity will remain high. Likewise, the potential beneficial impact on human health of some forms of medicine depends entirely on the achievement of actual improvements in the economic and social conditions of the users.

Despite massive efforts to build up formal health care systems, the majority of the Third World population live beyond the reaches of these systems and still depend on traditional health services. The highly centralized health care in developing countries has proven ineffective in providing services, especially to the poor and rural sections of society, and it is now widely believed that low cost health systems based on the primary health care approach will reach more people. On the other hand, governments and donors have gradually recognized that people possess an intimate knowledge of the relationship between the environment and their health and well-being, and that health programmes and projects have to build on this understanding from the outset.

Women most often are the ultimate procurers of fuel and water and they play a key role in managing issues of fundamental importance to the health of their families. A particular effort should therefore be made to help them carry out these tasks with due regard to the health dimension of their undertakings.

Constraints

In the last 10–15 years most developing countries have witnessed a decline in the life-quality of the poorer sections of their populations. This has been accompanied by and related to degradation of the physical environment which forms the very basis of existence of their people. While negative economic, political, demographic and social development trends are the fundamental causes of the deterioration of human health and environmental quality, some forms of development interventions have contributed to worsen the situation. The improvement of the economic and social conditions required to establish control over population growth may not materialize in the near future and a population policy must therefore also include other factors, such as improved health services, better education and advancement of the status of women. The explosive growth of urban settlements, far beyond the capacity of housing, sanitation and water supply facilities creates special problems, particularly for the inhabitants of slum settlements. The lack of institutional and managerial capacity and capability in the health sector combined with reliance on centralized and compartmentalized approaches to public health care have hampered the extension of a needs-oriented and truly effective health service system and the spread of knowledge about relevant health issues to the wider population. Recently, policies of economic austerity have implied significant cut-backs in public expenditure on health services.

Strategy

Pursuing the objective of establishing a sound relationship between the environment and people for the benefit of their health, Danida will take the following overall strategy elements as its points of departure:

- Take the health aspects into account in all development efforts which interfere with the environment.
- Emphasize preventive measures rather than cure in dealing with environmentally determined health hazards.
- Take the knowledge and ideas of people as the starting point for planning and carrying out development interventions.
- Strengthen the capacity of developing countries at all levels to identify, understand and handle critical health related environmental issues.

Action to be taken

The accomplishment of the task of establishing a sound relationship between the environment and people for the benefit of their health requires concerted action by all. The international organisations must carry out certain elements of this task which fall beyond the scope and capacity of governments and donors. In the countries concerned, fundamental changes will have to be brought about by governments, industry, other donors and private organisations in parallel to Danida's bilateral contribution. Danida will call for these interventions in multilateral fora, in the policy dialogue with governments and in the coordination of donor efforts.

Through International Organisations

1. At the international level Danida will promote attention to environment at the United Nations General Assembly and will actively work for a proper follow-up of the Report of the World Commission on Environment and Development as well as other relevant documents.
2. Danida will call for continued and strengthened follow-up on the relevant sections of the System-Wide Medium-Term Environment Programme.
3. Danida will co-operate with relevant organisations such as WHO, FAO, ILO and UNEP, Habitat and the development banks to ensure that the environmental considerations are integrated in the activities of the organisations.
4. In dealing with environment and health in international organisations Danida will emphasize the following:

   - An approach that combines evaluation of the potential risks of environmental pollutants, assessment of their actual impacts on human health and the natural environment, and the creation and strengthening of the capacity for prevention and control at the country level;
   - The development and strengthening of national capacities and institutions. Methods for establishing inventories of pollution sources should be emphasized, together with relevant training and the gradual build-up of laboratory services for monitoring, surveillance, and research, and for forecasting pollution and its implications. For national regulatory action, recommendations on permissible levels of pollution

and contamination in air, water, food, and in the homes and the workplace should be made, and methods developed for their adaption to the socio-economic conditions of different countries;

- Promotion of chemical safety through risk evaluation of potentially toxic chemicals, establishment and control of international agreements on transport, storage and disposal of toxic chemicals and waste, dissemination of information and strengthening of the capacity of safe handling of harmful chemicals in developing countries;
- Activities aimed at disseminating information and preparing guidelines for early notification and assistance and for handling the health consequences of chemical emergencies; support for the creation of national capacities for dealing with acute poisoning;
- Continuing investigation of methods for disease prevention and control and documentation and exchange of experience on the technical and economic aspects involved;
- Development and support of self-sustaining, self-reliant, low-cost approaches to the integration of environmental control of communicable diseases with primary health care. The strategy must also emphasize practical measures to promote food safety, especially within the context of primary health care, in the home and in food establishments, recognizing that the safety of food cannot be assured by reliance on food law and inspection alone;
- Priority should be given to promote health activities with an environmental aspect where women are the target group;
- Increased participation of NGOs to facilitate the integration of environmental aspects in health activities;
- As regards water supply and sanitation, organisations should follow the approaches already developed during IDWSD. The complementarity of drinking water supply and sanitation must be stressed in the programmes, as must inter-sectoral action and maximum possible use of resources available at local or at community level for construction, operation and maintenance;
- On the one hand, specific action on the working environment must aim at strengthening national institutions and capacity, legislation and regulations, and developing inspection and other measures to improve the safety of industrial plants and conditions in the workplace generally. On the other hand, problems of

the working environment should be addressed through relevant programmes in the field of labour and employment, to create a fuller and broader awareness of the issues and to provide up-to-date information on how all concerned can contribute to the achievement of environmental objectives in the discharge of their regular responsibilities;
- Where the working environment is outside the reach of the formal sector, linkages should be encouraged by programmes for general community development, rural development, primary health care, welfare housing and environmental protection. This approach must be supported through the development of awareness and by training among community leaders, health care workers, environmentalists, governments, the donor community and others. The objective must be to create an understanding of informal sector problems and to promote an integrated approach based on local resources and participation. Research into the policy and operational aspects of the approach needs to be encouraged;
- In occupational health and safety, efforts should be made to strengthen the capabilities of governments, workers and employers through training and transfer of information and technology on industrial safety and hygiene, in compliance also with the ILO standards.
- Measures must be taken to put an end to the illegal dumping of toxic waste while at the same time efforts must be made to strengthen the international rules with respect to dumping of toxic waste.

At country level

Where Danida is involved in bilateral or multi-lateral activities Danida will:

- Contribute to strengthening the national capability of relevant institutions to handle environmental protection issues related to human health, including occupational health issues;
- Support training and education of technical staff;
- Support the establishment of laboratory facilities for surveillance, control and study of air, water, soil and food contamination of importance to human health, including occupational health;

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- Promote the idea of having an impact assessment of environmentally related health aspects carried out as a matter of routine for all development projects, and more specifically in projects where Danida is directly or indirectly involved;
- Support research on and development of healthy use of biomass energy in homes with special focus on respiratory diseases;
- Support information, education and communication targeted at the general public;
- Seek ways to assist consumer groups in information dissemination activities;
- Support activities aimed at protecting pregnant women against potential hazards to unborn children;
- Support efforts to ensure nutritional sufficiency at the household level by promoting sound agricultural practices with multi-and mixed cropping;
- Support establishment of a system for national food security;
- Support essential drug programmes and rational use of drugs, including traditional medicines, through training of health workers and information to the public;
- Support a settlement policy which is balanced with the carrying capacity of the environment and conducive to health, involving also slum areas;
- Support the strengthening of rural health facilities in line with primary health care;
- Support a national population policy emphasizing the aspect of self-determination and "option".

At Project Level

In relation to specific Danida supported projects Danida will undertake:

- To make use of experience gained from previous projects regarding environment and health;
- To carry out an impact assessment of environmentally related health aspects as a matter of routine for all projects, in order to prevent detrimental and enhance beneficial health impacts of project activities;
- To provide for continuous assessment, surveillance, control and research in order to minimize environmental hazardous influence on human health, including occupational health;
- To use the national environmental resource base for promotion of environmental considerations and for solving project related environmental problems;

- To ensure that methods and approaches are adapted to socio-economic conditions prevailing in the project area;
- To carry out project related training in environmental and occupational health, in the homesteads and in the informal sector;
- To carry out project related information and communication activities regarding environmental and occupational health issues.

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List of Abbreviations and Acronyms

FAO	Food and Agriculture Organization of the United Nations
IDWSD	International Drinking Water supply and Sanitation Decade
IIED	International Institute for Environment and Development
ILO	International Labour Organization
NGO	Non Governmental Organization
PHC	Primary Health Care
TDR	Tropical Disease Research Program, WHO
UN	United Nations
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNICEF	United Nations International Children's Emergency Fund
WHO	The World Health Organization

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